

NEW RECORDS OF BATS FROM SOUTH-EASTERN ASIA, WITH TAXONOMIC NOTES

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INTRODUCTION

BATS from Malaya, Java and Sulawesi (Celebes) identified in recent years at the British Museum (Natural History) have included specimens representing a number of poorly known species and thereby of taxonomic interest and importance, or which provide further distributional records. The majority of the Malayan specimens have come to London through the agency of Lord Medway and were collected by him or by Mr G. C. Yong. A further interesting specimen from Malaya has been provided by Dr D. R. Wells of the School of Biological Sciences, the University of Malaya. The Indonesian specimens are from a collection submitted for identification by Captain P. F. D. Van Peenen, M.C., U.S.N., Officer in Charge, U.S. Naval Medical Research Unit No. 2, Djakarta Detachment. My thanks are due also to Dr G. G. Musser and Dr Karl F. Koopman of the American Museum of Natural History, New York, who waived a prior claim to the Sulawesian specimens, and to Dr H. W. Setzer of the United States National Museum of Natural History, the Smithsonian Institution, Washington, who arranged the loan of one of the specimens discussed. Measurements are in millimetres: unless otherwise indicated, the specimens have been donated to the collections of the British Museum (Natural History).

SYSTEMATIC SECTION

 *Chironax* (?) *melanocephalus* (Temminck, 1825)

Sulawesi: Soroako, south Sulawesi. ♀ (young adult) B.M. 73.1802.

Chironax has been unreported hitherto from Sulawesi. This young adult specimen differs in a number of features from Malayan material referred to *C. melanocephalus* and apparently also in some ways from Javan specimens, of which none is available for comparison. Consequently, it is referred to *C. melanocephalus* with considerable hesitation.

This Sulawesian specimen lacks the distinctive blackish cap usually characteristic of *Chironax* although the nape and crown are darker brown than the back which is warm brown, tinged with grey over the shoulders. The throat and the sides of the neck are creamy white, the belly yellowish white and the flanks brown, this colour extending across the hinder part of the ventrum. In colour the specimen agrees quite well with the original description by Temminck (1825: 190) of specimens from

Java : it differs from mainland specimens in its generally paler dorsal surface and also lacks any rufous or orange at the sides of the neck, a feature sometimes found in mainland examples.

There are some differences in wing structure when a comparison is made with mainland and Javan specimens. In particular, the fifth metacarpal is relatively a little longer, and the second phalanges of the third, fourth and fifth digits are relatively a little shorter, those of the fourth and fifth digits not exceeding in length the first phalanges of their respective digits as they do in continental and Javan examples. The relevant wing structures are summarized in Table 1 and in these respects it can be seen that the Sulawesi specimen approaches the closely related genus *Balionycteris*.

TABLE 1
Wing indices of *Chironax* and *Balionycteris*
Length of forearm = 1000

	<i>Chironax</i>			<i>Balionycteris</i>
	Malaya	Java*	Sulawesi	
Third digit				
Metacarpal	677-711	640 635	705	710-780
First phalange	474-533	489 488	507	474-548
Second phalange	584-657	640 623	568	559-653
Fourth digit				
Metacarpal	617-679	617 578	641	693-739
First phalange	368-415	373 378	373	374-430
Second phalange	396-444	418 422	360	352-415
Fifth digit				
Metacarpal	659-704	640 622	708	712-764
First phalange	318-360	344 322	319	330-364
Second phalange	339-384	348 344	317	312-354

* 'Co-types' of *C. melanocephalus*, from Andersen (1912 : 676).

Cranially the specimen from Sulawesi is a little smaller than the mainland examples but its cranial dimensions fall within the range of variation reported for the Javan 'cotypes' by Andersen (1912 : 678). The supraorbital region is a little more swollen medianly than in continental specimens and the postorbital processes are more massively developed. As might be expected in a young adult, the premaxillae are not solidly fused anteriorly. The post-canine teeth are generally rather smaller than are those of specimens from the mainland, with pm⁴ more rounded, less rectangular in outline, while pm³ lacks completely the antero-external cusp customary in *C. melanocephalus*. This cusp, however, is very small in some Malayan specimens.

Chironax melanocephalus has been reported from Java, Sumatra (Chasen, 1940 : 28, 30), Nias Island (Thomas, 1923 : 252), Malaya (Chasen, loc. cit. ; Hill, 1961 : 640) and from southern Thailand (Hill and Thonglongya, 1972 : 181), who also reported further Malayan specimens. The presence of *Chironax* in Sulawesi is not unexpected

but the exact taxonomic status of the Sulawesi population must remain to some extent uncertain until further specimens from Sulawesi and Java are available.

Measurements of the specimen from Sulawesi: length of forearm 44.2; length of third metacarpal 31.1; length of its first phalange 22.4; length of its second phalange 25.1; length of fourth metacarpal 28.3; length of its first phalange 16.5; length of its second phalange 15.9; length of fifth metacarpal 31.3; length of its first phalange 14.1; length of its second phalange 14.0; greatest length of skull 22.2; condylobasal length 21.4; condylocanine length 20.8; palatal length 11.1; palation to incisive foramina 9.3; palation to basion 8.2; length orbit-nares 5.2; width of braincase 9.8; mastoid width 10.0; zygomatic width 14.3; m^1 - m^1 (crowns) 6.3; p^4 - p^4 (crowns) 6.3; lachrymal width 6.1; c^1 - c^1 (cingula) 4.3, (alveoli) 4.0; postorbital width 5.5; interorbital width 4.9; width of mesopterygoid fossa 2.9; width between p^4 - p^4 3.8; width between bases of canines 1.9; orbital diameter 5.6; length of mandible from condyle 16.0; length of complete mandible from both condyles 15.2; coronoid height 7.3; c - m^1 (crowns) 6.9; c - m_2 (crowns) 7.5 (in order of Andersen, 1912: 678, with interpolations).

Measurements of teeth: length \times width of pm^3 1.7 \times 1.1; of pm^4 1.7 \times 1.2; of m^1 1.3 \times 0.9; of pm_1 0.7 \times 0.7; of pm_3 1.6 \times 1.1; of pm_4 1.7 \times 1.2; of m_1 1.4 \times 0.9; of m_2 0.8 \times 0.6 (notation of teeth based on Andersen, 1912: 680).

It may be noted that by error the illustration of *Chironax* in the editions and printings of Walker (1964, 1965, 1968) is not of *C. melanocephalus* but of a young *Rousettus*.



Rhinolophus pusillus Temminck, 1834

Malaya: Pasang Kamunting, Kg. Ginting, Penang. ♀ B.M. 73.608.

Andersen (1905: 121) summarized the many different forms of *Rhinolophus* before then confused under *Rhinolophus minor* Horsfield, 1824, envisaging a *lepidus* group composed of *lepidus*, *minor* and *subbadius* subgroupings. Later, the same author (1918: 376) in a paper issued on his behalf by Oldfield Thomas renamed this the *pusillus* group and added a number of briefly diagnosed new forms. Tate and Archbold (1939: 3) listed the names allocated to the group, retaining the subdivisions proposed by Andersen. These authors included *R. minor* and *R. pusillus* as distinct species but Andersen (1905: 126) considered *pusillus* a synonym of *minor*; however, *Rhinolophus minor* Horsfield, 1824 is preoccupied (Chasen, 1940: 38; Ellerman & Morrison-Scott, 1951: 116).

The species has not hitherto been recorded from the Malay Peninsula: this specimen from Penang agrees closely with a small series from Java and with one specimen from Madura identified by Andersen as *R. pusillus*, the species that he called *R. minor* in his early investigation (1905: 121) of the group. There is close agreement also between the Penang specimen and a series in the collections of the British Museum (Natural History) from the island of Tioman, off the east coast of Malaya. *Rhinolophus pusillus* is small, easily recognized by its upright triangular connecting process and small skull (Table 2).

TABLE 2
Measurements of *Rhinolophus pusillus*

Registration No.	Sex	Length of forearm	Greatest length of skull to canine	Condylacanine length	Width across rostral swellings	Least interorbital width	Zygomatic width	Width of braincase	Mastoid width	C ₁ -C ₁	m ³ -m ³	C-m ³	Length of complete mandible	C-m ³	Locality
9.1.5.176	♂	39.9	15.2	-	4.5	2.2	-	-	-	4.2	-	-	10.1	-	Java
9.1.5.177	♂	37.8	-	-	4.3	2.1	7.8	-	-	3.8	5.7	5.7	-	6.0	Java
9.1.5.178	♂	39.4	-	-	4.3	-	-	-	-	-	5.9	5.8	10.4	6.3	Java
61.1747	♂	39.3	15.6	13.6	4.1	2.1	7.8	7.1	7.8	3.8	5.5	5.6	9.9	5.9	Java
10.4.7.8	♀	-	15.7	13.7	4.3	2.0	7.5	6.8	7.7	3.8	5.6	5.8	10.1	6.2	Madura
61.1679	♀	38.0	-	13.6	4.2	2.0	8.1	6.8	7.7	3.8	5.7	5.8	10.5	6.2	Tioman I.
61.1682	♂	38.1	15.7	13.6	4.2	2.0	8.1	6.8	7.7	3.8	5.7	5.8	10.5	6.2	Tioman I.
61.1684	♂	39.7	-	13.7	4.3	2.2	8.2	6.9	7.8	3.9	5.8	5.6	9.9	6.0	Tioman I.
1973.008	♂	39.3	15.8	13.7	4.3	2.2	8.2	6.9	7.8	3.9	5.8	5.6	9.9	6.0	Penang
28.7.1.18	♀	37.3	15.3	-	4.4	2.0	8.0	-	-	3.8	5.8	5.8	9.9	6.3	South Vietnam
28.7.1.19	♀	37.9	15.6	13.8	4.3	2.0	8.2	6.8	7.7	3.8	5.9	5.9	10.0	6.4	South Vietnam

Andersen (1905 : 126) recorded *R. minor* (= *pusillus*) from Darjeeling, Thailand and Java. As Osgood (1932 : 215) pointed out, when Andersen wrote further on the *pusillus* group (1918 : 376) and named *R. blythi blythi* and *R. b. szechwanus*, evidently he had concluded that the mainland forms were separable from *pusillus* of Java. Indeed, Andersen has re-labelled the specimens in the British Museum (Natural History) on which the continental records of *pusillus* were based as '*szechwanus*'. Osgood considered that specimens obtained in Cochin China (South Vietnam) by Delacour and Lowe (B.M. 28.7.1.18-19) and referred to *pusillus* by Thomas were doubtless closely related if not identical to *R. blythi calidus* Allen, 1923, to which Osgood referred a specimen from Tonkin (North Vietnam), suggesting that since the distinctions between the various forms seemed unclear it might be preferable to treat them as races of *pusillus*, the earliest name. There is every probability, therefore, that *Rhinolophus pusillus* Temminck, 1834 must replace *R. blythi* Andersen, 1918 if this is thought to be specifically distinct. Ellerman and Morrison-Scott (1951 : 117) considered *R. blythi* a subspecies of *R. cornutus* Temminck, 1835, to which Van Peenen, Ryan & Light (1969 : 61) allocated specimens from South and North Vietnam (presumably those reported by Osgood) and from Thailand. However, Wang *et al.* (1962 : 556, 558, 568) reported *R. cornutus pumilus* Andersen, 1905 and *R. blythi* (as a species) from Kwangsi.

✱ *Rhinolophus acuminatus acuminatus* Peters, 1871

Malaya : Kuala Kenarong, Ulu Perak. ♂, ♀ B.M. 73.609-610.

Rhinolophus acuminatus has remained unreported from Malaya although there is a number of records from Thailand, Laos and Cambodia (Hill & Thonglongya, 1972 : 185), and the species occurs also on Sumatra and the nearby islands of Engano and Nias, on Borneo, Java and on Lombok. Like those from Thailand and Laos previously reported, these Malayan specimens agree closely in size with *R. a. acuminatus* from Java. Both have been preserved in alcohol. The female is very similar in colour to reddish brown examples from Java, its dorsal surface brown, tinged with russet, especially posteriorly. Ventrally it is greyish brown, the hairs pale based, pale grey brown for much of their length and extensively tipped with grey. Dorsally, the male is browner, lacking russet, lightly tipped over the shoulders with silver grey : ventrally it is paler than the female, more nearly fawn, with a brownish tinge.

Measurements (♂ B.M. 73.609, ♀ B.M. 73.610) : length of forearm 49.1, 47.8 ; width of noseleaf 8.1, 8.0 ; greatest length of skull to canine 21.5, 20.5 ; condylo-canine length 19.2, 18.2 ; width across nasal swellings 6.1, 5.8 ; least interorbital width 2.5, 2.7 ; zygomatic width 11.6, 11.3 ; width of braincase 9.0, 9.0 ; mastoid width 10.2, 9.9 ; c¹-c¹ 5.6, 6.0 ; m²-m³ 8.3, 8.3 ; c-m³ 8.6, 8.0 ; length of complete mandible 15.2, 13.7 ; c-m₃ 9.2, 8.8.

The subspecies of *R. acuminatus* as they are defined by Andersen (1905 : 132, 1906 : 657) seem separable only by relatively small features. Mainland specimens have the lower part of the lateral margins of the sella more or less parallel as in

acuminatus from Java and in *audax* from Lombok, the sella not abruptly widened basally as in *sumatranus* from Sumatra or *circe* from Nias, or in *calypso* from Engano in which the sella, although widened, is less so than in these but which has a very wide noseleaf. There seem no consistent size differences between the subspecies: a series from Java suggests a degree of sexual dimorphism in size, with females tending to be a little smaller than males.

* *Myotis horsfieldii horsfieldii* (Temminck, 1840)

Sulawesi: Wawondula, south Sulawesi. ♀ B.M. 73.1804.

This is the first of *Myotis horsfieldii* to be reported from Sulawesi, the species being known otherwise from Java, Borneo (Medway, 1965: 60), Malaya and perhaps Thailand (Hill, 1972: 31). For the present it is referred to the nominate subspecies: cranially it corresponds to or slightly exceeds the upper limits of size for Javan specimens as represented in London, but these derive from a single series from one locality. It is similar in size to the larger of Bornean specimens (*M. h. lepidus* (Thomas, 1915)) but no more than three examples of this subspecies are available. Medway (1965: 60) suggests that *lepidus* from Borneo may be distinguished from Javan *horsfieldii* by slightly shorter skull and slightly narrower braincase, conditions not supported by the available specimens. The condylobasal length of eighteen Javan specimens ranges from 13.2 to 14.7, in three from Malaya from 13.7 to 14.3 and from 14.3 to 14.7 in three from Borneo: the width of the braincase varies from 6.9 to 7.4 in Javan examples, from 6.9 to 7.3 in those from Malaya and from 7.1 to 7.3 in the specimens from Borneo, which include the holotype of *lepidus*. The Bornean subspecies appears therefore to be only weakly if at all separable.

Measurements of the specimen from Sulawesi: length of forearm 37.7; greatest length of skull 15.7; condylobasal length 14.4; condylocanine length 13.8; least interorbital width 3.6; zygomatic width —; width of braincase 7.4; mastoid width 8.0; c^1-c^4 4.2; m^2-m^3 6.0; $c-m^3$ 5.7; length of complete mandible 11.3; $c-m_3$ 6.2. The registration numbers of Malayan specimens measured by Hill (1972: 31) are incorrectly assigned. The measurements cited are of B.M. 61.2133 (forearm only), B.M. 65.320, B.M. 65.321, and of ♀ B.M. 16.4.21.16 (this number omitted) from Batu Burong, Pahang, in that order.

* *Pipistrellus circumdatus* (Temminck, 1840)

Java: Cibodas (= Tjibodas), Cianjur, west Java, 06°45' S, 107°00' E, at 1350 m. ♂. Original number 1435. Bogor Museum No. 10069 (at present at United States National Museum of Natural History, the Smithsonian Institution, Washington).

Kandang Badak, Cianjur, west Java, 06°47' S, 106°59' E, at 2425 m. ♂. Original number 1761. U.S. Naval Medical Research Unit No. 2, Djakarta Detachment.

Situ Gunung, Sukabumi (= Soekaeboemi), west Java, 06°50' S, 107°55' E, at 1000 m. ♀. B.M. 73.1805.

Malaya: Telecommunications Tower, Fraser's Hill, Pahang. ♂ B.M. 73.618.

Extant specimens of the poorly known south-east Asian species *Pipistrellus circumdatus* (Temminck, 1840) were briefly reviewed recently by Hill (1972 : 189), who described a closely related species, *P. societatis*, from Malaya. At that time, no more than five examples of *P. circumdatus* were known.

Although Temminck (1840 : 215) remarked that Boie and Macklot, who first obtained the species in the Tapos district of Java, sent several individuals to the Musée des Pays-Bas (the Rijksmuseum van Natuurlijke Historie, Leiden), the catalogues by Jentink (1887 : 277 ; 1888 : 178) of that collection report only a single specimen, in 1887 as 'one of the types of the species' for the skull, and in 1888 as 'type of the species' for the mounted specimen to which the skull belongs. This specimen remains in the Rijksmuseum van Natuurlijke Historie : a second example from Java, now in the collection of the British Museum (Natural History) (B.M. 7.1.1.401) is from the collection of R. F. Tomes, and since this collector obtained specimens from many sources, including the major museums of his day, it is possible that it is one of the original specimens obtained by Boie and Macklot.

Known continental specimens are limited to three. One, (B.M. 61.12.10.1) in the collection of the British Museum (Natural History), is of uncertain provenance. It came from T. C. Jerdon and is said by Blanford (1891 : 312) to have originated from southern India. Another (A.M.N.H. 114850), in the American Museum of Natural History, is from Pyepat, Upper Burma, and has been reported by Anthony (1941 : 81), Tate (1942 : 250) and by Hill (1972 : 36). The third, listed above, from Fraser's Hill, Pahang, Malaya, was briefly reported by Hill (1972 : 36, footnote). It is therefore of particular interest to record three specimens from Java obtained by the United States Medical Research Unit No. 2, Djakarta Detachment, and to present a more detailed account of the newly collected Malayan specimen.

The specimens from Java agree closely with the description by Temminck and with B.M. 7.1.1.401. The males are exactly similar in colour to this example, the blackish brown dorsal pelage finely but profusely tipped with shining orange or bronze, the ventral pelage dark brown, the hairs lightly tipped with grey except on the flanks where the tipping is brownish, sometimes faintly orange. The membranes are black and in B.M. 7.1.1.401 evidently have faded to a browner shade. The female specimen has dorsal pelage a little less finely tipped with orange, the individual orange hair tips slightly more extensive to give a coarser effect : its ventral surface resembles the ventral surface of the other specimens although the tips of the hairs tend to be more yellowish buff, especially anteriorly. Cranially, the specimens conform closely to B.M. 7.1.1.401, described, with the skull of the holotype of *circumdatus*, in the account already published (Hill, 1972 : 36).

The example from Malaya is very similar to the Burmese specimen (A.M.N.H. 114850) discussed by Hill (1972 : 36), its skull differing slightly in a number of features from the skulls of Javan specimens. It is generally a little smaller ; the cranial crests are less prominent, the supraorbital ridges slightly less evident but in this example not terminating in slight tubercles ; the frontal depression is a little shallower but the post-palatal extension is not shorter than in the Javan skulls as is the post-palatal extension of the Burmese example. As in the Burmese specimen, the post-palatal spine is narrow : although broken in two of the Javan skulls examined,

in the other two skulls from Javan specimens the spine is more broadly based. There is little difference in the dimensions of the teeth, although the canines of the Malayan specimen are very slightly less massive than are those of the Javan examples.

Initially, a comparison of the Burmese specimen with Javan material suggested (Hill, 1972 : 36) that the mainland and Javan populations might be subspecifically distinct. The new material confirms that small differences exist between the two populations but as yet insufficient specimens are available for any definite conclusion to be drawn. The Malayan specimen is of especial interest since it demonstrates the presence of *P. circumdatus* in Malaya with the newly described *P. societatis*, a closely similar species differing chiefly in smaller size, particularly of the rostrum, palate and dentition, and in its short post-palatal region (length of bony post-palate in four Javan specimens of *circumdatus* 1.5-1.7, in the Malayan specimen 1.7, in the holotype of *societatis* (B.M. 67.1605) 1.1).

Measurements (♂ 1435, ♂ 1761, ♀ B.M. 73.1805 from Java, ♂ B.M. 73.618 from Malaya, in that order) : length of forearm 41.2, 41.1, 42.1, 40.5 ; greatest length of skull 16.0, 16.3, 16.6, 15.5 ; condylobasal length 15.7, 15.7, 16.0, 14.9 ; condylo-canine length 15.4, 15.4, 15.7, 14.7 ; palatal length (excluding the post-palatal spine) 8.4, 8.4, 8.6, 8.0 ; length palatal bridge (excluding the post-palatal spine) 6.5, 6.6, 6.8, 6.4 ; length orbit-gnathion 4.2, 4.0, 4.2, 4.1 ; lachrymal width 7.1, 7.2, 7.3, 7.2 ; width across supraorbital tubercles or swellings 6.6, 6.6, 6.7, 6.4 ; zygomatic width 11.4, —, 11.7, — ; least interorbital width 4.2, 4.4, 4.3, 4.3 ; width of braincase 8.0, 8.1, 8.1, 7.9 ; mastoid width 8.7, 8.7, 9.1, 8.5 ; c^1-c^1 5.2, 5.3, 5.4, 5.0 ; m^3-m^3 —, 7.6, 7.7, 7.3 ; $c-m^3$ 6.2, 6.1, 6.3, 5.9 ; length of complete mandible —, 11.9, 11.9, 11.1 ; $c-m_3$ 6.5, 6.4, 6.7, 6.3.

Philetor brachypterus verecundus (Chasen, 1940)

Malaya : Ulu Gombok, Selangor. ♂ B.M. 73.597.

The genus *Philetor* with its sole species *P. brachypterus* is known from New Guinea, Malaya, Sumatra and, doubtfully, from Java and Banka (Hill, 1971 : 140). Its occurrence in Malaya was based initially on two female specimens from Perak originally described as *Eptesicus verecundus* by Chasen (1940 : 53), one the holotype collected on Mount Kledang by Dr R. Hanitsch (now B.M. 47.1437) and the other (at one time in the collections of the former Raffles Museum, Singapore) from an unspecified locality in that State. Medway (1969 : 35) mentions that it has been collected in Selangor. *Eptesicus verecundus* was transferred to *Philetor* by Hill (1966) who considered it a subspecies of *Philetor rohui* Thomas, 1902 from New Guinea : later, the same author (1971) referred *Vespertilio brachypterus* Temminck, 1840 from Sumatra to *Philetor* as a third subspecies, *brachypterus* taking precedence as the specific name.

This further specimen of *P. b. verecundus* has been donated to the collections of the British Museum (Natural History) by Dr D. R. Wells of the School of Biological Sciences, the University of Malaya. Its muzzle, ears and tragus agree closely with those of the holotype : the structure of the penis, hitherto unknown in *verecundus*,

is almost exactly like that of *P. b. rohui* (figured by Hill, 1966 : 375, fig. 1), differing only in slightly wider and deeper fissures in the ventral part of the glans.

Cranially there is close agreement with the holotype of *verecundus*. The braincase is very slightly more inflated than in *P. b. rohui* as it is in the holotype : the narial emargination, however, rather wider at the roots of i^{2-2} and broadly V-shaped apically in the holotype of *verecundus*, is in this specimen rather narrower and more rounded at the apex, thus conforming with *rohui* and with the holotype of *P. b. brachypterus* from Sumatra (Hill, 1971 : 141). The upper canines of the specimen from Selangor are a little more massive than in the holotype of *verecundus*, and the Selangor specimen differs from this and from *rohui* in having a narrow rather than wide post-palatal spine, and its basioccipital pits are a little less prominent.

Measurements : length of forearm 35.9 ; greatest length of skull — ; condylobasal length 14.7 ; condylocanine length 14.3 ; lachrymal width 6.7 ; width across ante-orbital foramina 5.5 ; least interorbital width 4.6 ; zygomatic width — ; width of braincase 8.3 ; mastoid width 9.0 ; c^1-c^1 5.4 ; m^3-m^3 6.7 ; $c-m^3$ 4.8 ; i^2-m^3 5.6 ; length of complete mandible 10.4 ; $c-m_3$ 4.9.

Miniopterus medius macrocneme Revilliod, 1914

Sulawesi : Wawondula, south Sulawesi. ♀, ♂ B.M. 73.1806-1807.

The length of the forearm and tibia, with the globose, high braincase and slender canines refer these specimens to *M. medius*, hitherto unreported from Sulawesi. They display the less massive dentition characteristic of the easterly subspecies *M. m. macrocneme* which until now has not been known to occur further west than the islands of Ambon and Ceram, in the Molucca Islands.

Measurements (♂ B.M. 73.1807, ♀ B.M. 73.1806) : length of forearm 44.4, 43.3 ; length of tibia 19.1, 18.8 ; greatest length of skull 13.7 ; 13.2 ; condylobasal length 13.1, 12.9 ; condylocanine length 12.6, 12.1 ; least interorbital width 3.4, 3.5 ; zygomatic width 7.4, 7.5 ; width of braincase 7.4, 7.2 ; mastoid width 7.6, 7.5 ; c^1-c^1 3.9, 3.7 ; m^3-m^3 5.4, 5.4 ; $c-m^3$ 5.1, 5.0 ; length of complete mandible 9.7, 9.5 ; $c-m_3$ 5.6, 5.3.

Phoniscus atrox Miller, 1905

Malaya : Tekom Forest Reserve, Jerantut, Pahang. ♂ B.M. 71.1135.

Until recently *P. atrox* was known in the literature from the holotype from Sumatra and from two further examples reported from southern Thailand by Kloss (1916 : 12). The first record for Malaya is of a subadult from the Ulu Gombok Forest Reserve, Selangor, at 2000 ft, reported by Medway (1969 : 43). This second Malayan specimen agrees exactly with those from southern Thailand.

Measurements : length of forearm 34.2 ; greatest length of skull 15.5 ; condylobasal length 13.7 ; condylocanine length 13.7 ; least interorbital width 3.8 ;

zygomatic width 8.7; width of braincase 7.0; mastoid width 7.4; c^1-c^1 3.6; m^3-m^3 5.5; $c-m^3$ 6.0; length of complete mandible 10.5; $c-m_3$ 6.5.

Tadarida johorensis (Dobson, 1873)

Malaya: Pulau, Kelantan, $4^{\circ}48' N$, $101^{\circ}57' E$, c. 780 ft. ♂♂ (11 subadult) B.M. 73.632, 636, 638-642, 647, 649-651, ♀♀ (6 subadult) B.M. 73.633-635, 637, 643, 644, 646, 648.

Extant accounts of *T. johorensis* are based on one or other of two specimens. The detailed descriptions by Dobson (1876: 180, 183, fig. a; 1877: 718, 726, fig. 5; 1878: 421, 432) refer to the holotype from Johore, Malaya. Later, Andersen (1907: 39, 44) described a further specimen from Soekaranda, Deli, Sumatra and gave an account of the features of its skull and dentition. These remained apparently the only known specimens until Chasen (1940: 59) recorded the species from Selangor, Malaya and from the island of Sri Buat, off the east coast of Johore. More recently, Medway & Yong (1969: 33) have recorded the material from Kelantan on which these notes are based, but as *T. plicata*.

Dobson and Andersen in their descriptions of this species emphasize the large interaural pocket which can be closed by an extension of the interaural band. The inner or anterior margins of the ears are joined by a thick, deep band of integument originating from a low transverse ridge on the muzzle, its upper margin elevated between the ears in a truncately triangular flap. Posteriorly the lower part of this band forms the anterior wall of a deep subtriangular or subquadrangular pocket between the ears, its lateral walls more or less parallel and its posterior wall a low, slightly curved ridge. The pocket is divided by a low median septum and contains a few long hairs at the bottom of its anterior part: otherwise the integument forming and surrounding the pocket is naked or nearly so. The free upper part of the interaural band is convex anteriorly, hollowed posteriorly, and forms a lid or cover to the pocket. Previous descriptions of this structure refer only to the male. The interaural box in two adult females from Kelantan exactly resembles that of the adult male: there is little variation among the younger examples in the series but in these the posterior wall of the pocket is sometimes less prominent and the pocket a little shallower than in the older specimens. The dorsal pelage of specimens (in alcohol) from Kelantan is uniformly mid-brown, the hairs paler at the extreme base. The ventral pelage is predominantly fawn but is browner at the flanks, this shade extending also to the sides of the throat.

Tadarida johorensis is very similar to *T. plicata* from which it differs chiefly in the presence of the interaural pocket. The small cranial differences separating the two species are admirably summarized by Andersen (1907: 40) and are confirmed by an adult female from the series from Kelantan. These are the absence of marked cranial ridges in *johorensis*, its low, ill-defined sagittal crest terminating more posteriorly and not extending on to the supraorbital region, with the facial foramen placed farther posteriorly immediately above the narrowest part of the postorbital

constriction ; a low rostrum in *johorensis*, with straight or slightly concave rostral profile which contrasts with the more inflated, convex profile of *plicata* ; a shallow narial emargination in *johorensis* which extends posteriorly to a line joining the anterior margins of the anteorbital foramina ; the upper incisors are shorter and more massive in *johorensis* which has shorter upper canines and smaller anterior premolars (pm^2), with the principal cusp of the second upper premolar (pm^4) less developed.

Measurements of adult specimens from Kelantan (σ B.M. 73.636, ♀ B.M. 73.635 (forearms only), ♀ B.M. 73.637) : length of forearm 46.7, 49.2, 46.4 ; greatest length of skull 19.6 ; condylobasal length 17.3 ; condylocanine length 16.7 ; least interorbital width 4.6 ; zygomatic width 11.2 ; width of braincase 9.9 ; mastoid width 10.6 ; c^1-c^1 4.7 ; m^3-m^3 8.2 ; $c-m^3$ 6.8 ; length of complete mandible 12.5 ; $c-m_3$ 7.3.

SUMMARY

New records of bats from the mainland and islands of south-eastern Asia include the first reports of *Rhinolophus pusillus* Temminck, 1834 (probably conspecific with *R. blythi* Andersen, 1918, which it antedates) from Malaya and the island of Tioman, and of *R. acuminatus acuminatus* from Malaya. *Chironax melanocephalus*, *Myotis horsfieldii horsfieldii* and *Miniopterus medius macrocneme* are recorded for the first time from Sulawesi. Further specimens of *Pipistrellus circumdatus* are recorded from Java and the first Malayan example of this species is reported in detail. The first male specimen of *Philetor brachypterus verecundus* is described from Malaya and a further specimen of *Phoniscus atrox* reported from that country. A series of *Tadarida johorensis* from Kelantan is reported and establishes the presence of the interaural pocket, hitherto known only from the adult male, in female and young examples.

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